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Wadeable Streams Assessment Field Operations Manual



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WADEABLE STREAM ASSESSMENT: FIELD OPERATIONS MANUAL

NOTICE

The intention of the WSA project is to provide a comprehensive “State of the Streams” assessment for streams across the United States. The complete documentation of overall WSA project management, design, methods, and standards is contained in five companion documents, including:

- *Wadeable Streams Assessment: Quality Assurance Project Plan*
- *Wadeable Streams Assessment: Site Evaluation Guidelines*
- *Wadeable Streams Assessment: Field Operations Manual*
- *Wadeable Streams Assessment: Benthic Laboratory Methods*
- *Wadeable Streams Assessment: Water Chemistry Laboratory Manual*

This document (*Field Operations Manual*) contains a brief introduction, procedures to follow at the base location and on-site, including methods for sampling water chemistry (grabs and *in situ*), stream discharge, benthic macroinvertebrates, and physical habitat. These methods are based on the guidelines developed and followed in the Western Environmental Monitoring and Assessment Program (Peck et al. 2003). Methods described in this document are to be used specifically in work relating to WSA. All Project Cooperators should follow these guidelines. Mention of trade names or commercial products in this document does not constitute endorsement or recommendation for use. More details on specific methods for site evaluation, sampling, and sample processing can be found in the appropriate companion document.

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FOREWORD

The strategic plan of USEPA calls for a report on the results of a statistical survey of the condition of the Nation's waters, conducted in cooperation with the states. Therefore, USEPA's Office of Water with support from the Office of Research and Development is initiating a national assessment of the ecological condition of wadeable streams by collaborating with state water quality agencies. The result is a Wadeable Streams Assessment (WSA) Program that consists of a comprehensive program for surveying, assessing, and diagnosing ecological condition. This assessment will generate statistically valid estimates of the ecological health of streams through sampling a representative assemblage of the aquatic community and associated ecological data. A determination of related causes and sources of degradation to these aquatic resources will be investigated.

This document contains the field operations and bioassessment methods for evaluating the health and biological integrity of wadeable freshwater streams throughout the United States. These methods can be used by state and tribal water quality agencies as well as USEPA regional, enforcement, and research programs engaged in condition assessments and/or trends monitoring for the effects of impacts on aquatic organisms, particularly benthic macroinvertebrates in wadeable streams throughout the nation. The program addresses methods and techniques for sample collection; sample preparation; processing of structural and functional measures by using organism identification and enumeration; the survey and evaluation of physical habitat structure; the computerization, analysis, and interpretation of biological data; and ecological assessments.

Companion documents include the overall Quality Assurance Program Plan (QAPP) and Laboratory Operations Manuals for processing the benthic macroinvertebrate assemblage samples and water chemistry.

ABSTRACT

The Wadeable Streams Assessment program focuses on the use of a consistent scientific and technical tools for evaluating ecological conditions on regional and national scales. The methods and instructions for field operations presented in this manual for surveys of wadeable streams were initially developed and tested during 5 years of pilot and demonstration projects (1993 - 1997) and modified for use in a study of streams in the Western US (2000-2002). These projects were conducted under the sponsorship of the U.S. Environmental Protection Agency and its collaborators through the Environmental Monitoring and Assessment Program (EMAP). This document describes procedures for collecting data, samples, and information about the benthic macroinvertebrate assemblage, environmental measures, or attributes of indicators of stream ecosystem condition, and were developed based on standard or accepted methods, modified as necessary to adapt them to sampling requirements for the Wadeable Streams Assessment. They are intended for use in field studies sponsored by the USEPA, or monitoring programs developed and implemented by various State and tribal agencies. In addition to methodology, additional information on data management, safety and health, and other logistical aspects is integrated into the procedures and overall operations. Procedures are described for collecting field measurement data and/or acceptable index samples for several response and stressor indicators, including water chemistry, physical habitat, and benthic macroinvertebrate assemblages. The manual describes field implementation of these methods and the logistical foundation constructed during field projects. Flowcharts and other graphic aids provide overall summaries of specific field activities required to visit a stream site and collect data for these indicators. Tables give step-by-step procedural instructions. These figures and tables can be extracted and bound separately to make a convenient quick field reference for field teams. The manual also includes example field data forms for recording measurements and observations made in the field and sample tracking information. Checklists of all supplies and equipment needed for each field task are included to help ensure that these materials are available when required.

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ACRONYMS, ABBREVIATIONS, AND MEASUREMENT UNITS

Acronyms and Abbreviations

AFDM	Ash-free dry mass
APA	Acid/Alkaline Phosphatase Activity
BPJ	Best Professional Judgment
BOD	Biological Oxygen Demand
CENR	(White House) Committee on the Environment and Natural Resources
CFR	Code of Federal Regulations
dbh	Diameter at breast height
DC	Direct Current
DIC	Dissolved Inorganic Carbon
DLGs	Digital Line Graphs
DO	Dissolved oxygen
EERD	Ecological Exposure Research Division
EMAP	Environmental Monitoring and Assessment Program
EMAP-SW	Environmental Monitoring and Assessment Program-Surface Waters Resource Group
EMAP-WP	Environmental Monitoring and Assessment Program-Western Pilot study
EPA	U.S. Environmental Protection Agency
ERB	Ecosystems Research Branch
GPS	Global Positioning System
ID	identification
LWD	Large Woody Debris
MAHA	Mid-Atlantic Highlands Assessment
MAIA	Mid-Atlantic Integrated Assessment
NAWQA	National Water-Quality Assessment Program
NERL	National Exposure Research Laboratory
NHEERL	National Health and Environmental Effects Research Laboratory
ORD	Office of Research and Development
OSHA	Occupational Safety and Health Administration
P-Hab	physical habitat
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RBP	(EPA) Rapid Bioassessment Protocols
R-EMAP	Regional Environmental Monitoring and Assessment Program
SL	Standard length
SOP	Standard Operating Procedure
TIME	Temporally Integrated Monitoring of Ecosystems
TL	Total length
USGS	United States Geological Survey
WED	Western Ecology Division
WSA	Wadeable Streams Assessment
YOY	young of year
YSI	Yellow Springs Instrument system

ACRONYMS, ABBREVIATIONS, AND MEASUREMENT UNITS (CONTINUED)

Measurement Units

amps	amperes
cm	centimeter
ft	foot
gal	gallon
ha	hectare
Hz	Hertz
in	inches
L	liter
m	meter
m ²	square meters
mg/L	milligram per liter
mm	millimeter
μm	micrometer
μS/cm	microsiemens per centimeter
mS/cm	millisiemens per centimeter
msec	millisecond
ppm	parts per million
psi	pounds per square inch
V	volts
VA	volt-ampere